

WHAT IS CLAIMED IS:

1. A disk array system comprising:
  - a first housing for storing one or plural RAID groups each formed out of a plurality of hard disk drives for transmitting/receiving data in accordance with a first interface standard, said hard disk drives being connected through a communication path;
  - a second housing for storing one or plural RAID groups each formed out of a plurality of hard disk drives for transmitting/receiving data in accordance with a second interface standard, said hard disk drives being connected through said communication path via a plurality of converting units for converting said first and second interface standards into each other, said hard disk drives being lower in reliability than said hard disk drives stored in said first housing; and
  - a controller including a channel control portion, a disk control portion, a cache memory and a CPU, said channel control portion being connected to an information processing apparatus so as to be able to establish communication therewith, and receiving requests from said information processing apparatus, said requests including a read request to read data from said hard disk drives in said first or second housing and a write request to write data into said hard disk drives in said first or second housing, said disk control portion being connected to said plurality of hard disk drives in said first and second housings

through said communication path so as to be able to establish communication with said plurality of hard disk drives in said first and second housings, and performing input/output of data and parity data from/to said plurality of hard disk drives in said first and second housings in accordance with said read request or said write request received by said channel control portion, said parity data being data for detecting errors over a plurality of pieces of data including said data from/to said plurality of hard disk drives in said first and second housings, said cache memory temporarily storing data to be written into said plurality of hard disk drives, said CPU administering control over said channel control portion and said disk control portion;

wherein said controller reads a plurality of pieces of data including data stored in said plurality of hard disk drives in said second housing and parity data for said plurality of pieces of data from all of said hard disk drives of said RAID group to which said hard disk drives storing said data belong, and examines whether said plurality of pieces of data including said data have been written in said hard disk drives with erroneous contents or not.

2. A disk array system according to Claim 1, wherein said controller receives, from said information processing apparatus, said read request to read data stored in one of said hard disk drives in said second

housing, and then performs said examination upon said data.

3. A disk array system according to Claim 1, wherein said controller performs said examination upon data stored in said plurality of hard disk drives in said second housing regardless of said read request from said information processing apparatus.

4. A disk array system according to Claim 1, wherein:

    said controller stores, into an update control table, a position where data written into one of said hard disk drives in said second housing in accordance with said write request from said information processing apparatus has been written in said hard disk drive;

    said controller performs said examination upon said data stored in said position stored in said update control table, and stores, into said update control table, information indicating the completion of said examination performed on said data stored in said position; and

    said controller receives, from said information processing apparatus, said read request to read data stored in one of said hard disk drives in said second housing, then refers to said update control table and performs said examination upon said data when said examination has not been performed upon said data.

5. A disk array system according to Claim 1,

wherein said controller writes data into one of said hard disk drives in said second housing in accordance with said write request from said information processing apparatus, then moves a head belonging to said hard disk drive from a position where said data has been stored, thereafter reads said data from a magnetic disk belonging to said hard disk drive and from said cache memory, and compares said two pieces of data read out.

6. A disk array system according to Claim 1, wherein said controller writes data into one of said hard disk drives in said second housing in accordance with said write request from said information processing apparatus, then moves a head belonging to said hard disk drive from a position where said data has been stored, thereafter reads a part of said data from a magnetic disk belonging to said hard disk drive and from said cache memory, and compares said two pieces of data read out.

7. A disk array system according to Claim 1, wherein:

                  said controller writes data into one of said hard disk drives in said second housing in accordance with said write request from said information processing apparatus, and then moves a head belonging to said hard disk drive from a position where said data has been stored; and

                  said controller thereafter reads said data

from a magnetic disk belonging to said hard disk drive and from said cache memory and compares said two pieces of data read out when the size of said data is smaller than a predetermined value, or reads a part of said data from said magnetic disk and from said cache memory and compares said two pieces of data read out when the size of said data is not smaller than a predetermined value.

8. A disk array system according to Claim 1, wherein when the number of write requests from said information processing apparatus for one of said hard disk drives in said second housing exceeds a predetermined number, said controller writes data stored in a disk cache belonging to said hard disk drive, into a magnetic disk belonging to said hard disk drive, reads said data from said magnetic disk and from said cache memory belonging to said controller, and compares said two pieces of data read out.

9. A disk array system according to Claim 1, wherein said controller writes data stored in a disk cache belonging to each of said hard disk drives in said second housing, into a magnetic disk belonging to said hard disk drive, reads said data from said magnetic disk and from said cache memory belonging to said controller and compares said two pieces of data read out, whenever predetermined time has passed.

10. A disk array system according to Claim 1, wherein when there is no free space in a disk cache

belonging to each of said hard disk drives in said second housing, said controller writes data stored in said disk cache belonging to said hard disk drive, into a magnetic disk belonging to said hard disk drive, reads said data from said magnetic disk and from said cache memory belonging to said controller, and compares said two pieces of data read out.

11. A disk array system according to Claim 1, wherein:

each of said hard disk drives has a plurality of heads for reading/writing data;

said controller stores, into a head check control table, one of said heads which has written data into said hard disk drive in said second housing in accordance with said write request from said information processing apparatus; and

said controller receives said read request from said information processing apparatus, then refers to said head check control table, then writes examination data into a magnetic disk belonging to said hard disk drive using one of said heads to be used for reading said data, reads said examination data from said magnetic disk and compares said read data with said examination data when said head used for reading said data has been stored in said head check control table.

12. A disk array system according to Claim 1, wherein:

said controller receives, from said information processing apparatus, said write request to write data into one of said hard disk drives in said second housing, then forms a data unit out of data constituted by a plurality of sectors based on said data to be written and parity data for detecting data errors in said plurality of sectors, and writes said data unit into said hard disk drive; and

    said controller receives, from said information processing apparatus, said read request to read said data, then reads said data unit and examines whether said data is stored in said hard disk drive with erroneous contents or not.

13.       A disk array system according to Claim 12, wherein said controller divides said data unit into a plurality of pieces and writes said pieces of said data unit into a plurality of hard disk drives belonging to said RAID groups in said second housing respectively.

14.       A disk array system according to Claim 1, wherein:

    said first interface standard is a fiber channel standard, said second interface standard is a serial ATA standard, and said communication path is an FC-AL.

15.       A disk array system according to Claim 1, wherein:

    said first interface standard is a fiber channel standard, said second interface standard is a

parallel ATA standard, and said communication path is an FC-AL.

16. A method for controlling a disk array system including:

a first housing for storing one or plural RAID groups each formed out of a plurality of hard disk drives for transmitting/receiving data in accordance with a first interface standard, said hard disk drives being connected through a communication path;

a second housing for storing one or plural RAID groups each formed out of a plurality of hard disk drives for transmitting/receiving data in accordance with a second interface standard, said hard disk drives being connected through said communication path via a plurality of converting units for converting said first and second interface standards into each other, said hard disk drives being lower in reliability than said hard disk drives conforming to said first interface standard; and

a controller including a channel control portion, a disk control portion, a cache memory and a CPU, said channel control portion being connected to an information processing apparatus so as to be able to establish communication therewith, and receiving requests from said information processing apparatus, said requests including a read request to read data from said hard disk drives in said first or second housing and a write request to write data into said

hard disk drives in said first or second housing, said disk control portion being connected to said plurality of hard disk drives in said first and second housings through said communication path so as to be able to establish communication with said plurality of hard disk drives in said first and second housings, and performing input/output of data and parity data from/to said plurality of hard disk drives in said first and second housings in accordance with said read request or said write request received by said channel control portion, said parity data being data for detecting errors over a plurality of pieces of data including said data from/to said plurality of hard disk drives in said first and second housings, said cache memory temporarily storing data to be written into said plurality of hard disk drives, said CPU administering control over said channel control portion and said disk control portion;

      said method comprising the steps of:

          reading a plurality of pieces of data including data stored in said plurality of hard disk drives in said second housing and parity data for said plurality of pieces of data from all of said hard disk drives of said RAID group to which said hard disk drives storing said data belong; and

          examining whether said plurality of pieces of data including said data have been written in said hard disk drives with erroneous contents or not;

said steps being carried out by said controller.

17.       A method for controlling a disk array system according to Claim 16, further comprising the steps of:

        writing data into one of said hard disk drives in said second housing in accordance with said write request from said information processing apparatus, and then moving a head belonging to said hard disk drive from a position where said data has been stored;

        thereafter reading said data from a magnetic disk belonging to said hard disk drive and from said cache memory; and

        comparing said two pieces of data read out;  
        said steps being carried out by said controller.

18.       A method for controlling a disk array system according to Claim 16, further comprising the steps of:

        receiving, from said information processing apparatus, said write request to write data into one of said hard disk drives in said second housing, and then forming a data unit out of data constituted by a plurality of sectors based on said data to be written and parity data for detecting data errors in said plurality of sectors;

        writing said data unit into said hard disk drive;

        receiving, from said information processing

apparatus, said read request to read said data, and then reading said data unit; and

examining whether said data is stored in said hard disk drive with erroneous contents or not;

said steps being carried out by said controller.

19. A method for controlling a disk array system according to Claim 16, wherein:

said first interface standard is a fiber channel standard, said second interface standard is a serial ATA standard, and said communication path is an FC-AL.

20. A method for controlling a disk array system according to Claim 16, wherein:

said first interface standard is a fiber channel standard, said second interface standard is a parallel ATA standard, and said communication path is an FC-AL.